SNOW SAMPLING SURVEY
near
CANADIAN PACIFIC
FOREST PRODUCTS LIMITED,
THUNDER BAY

MARCH, 1990

SNOW SAMPLING SURVEY
near
CANADIAN PACIFIC FOREST PRODUCTS LIMITED,
THUNDER BAY,

February, 1989

D. J. Racette
Environmental Scientist

H. D. Griffin
Chief, Air Quality Assessment

TECHNICAL SUPPORT SECTION
NORTHWESTERN REGION
ONTARIO MINISTRY OF THE ENVIRONMENT
March, 1990

INTRODUCTION

Canadian Pacific Forest Products Limited (CPFP) operates a forest products complex in Thunder Bay. The company produces kraft and sulphite pulp, newsprint, and dimensional lumber. Process steam is generated by boilers fueled with coal and gas. The Ontario Ministry of the Environment has conducted several snow sampling surveys around CPFP.[1,2,3,4,5,6] The purpose of these surveys was to assess the impact of fallout of particulate matter around CPFP property.

Past studies have shown that levels of several contaminants exceeded Ministry guidelines in snow around CPFP property. Since the date of the most recent survey (1985), CPFP closed its waferboard plant, which was a major source of particulate matter emissions. To document the current situation, a snow sampling survey was carried out in February, 1989.

METHODS

Snow was sampled on February 14, 1989, from 12 sites around CPFP (Figure 1) and from two sites remote from the study area. All sampling sites were at points sampled in one or more earlier surveys. Standard Ministry sampling and sample processing procedures were followed.[7] Snow meltwater was analysed for calcium, chloride, sodium, sulphate, conductivity, solids and pH at the Ministry's Thunder Bay laboratory. Meltwater analysis for carbon was also requested but, due to a problem at the Toronto laboratory, could not be done.

The data from this study were evaluated in relation to contaminant guidelines developed by the Ministry. The guidelines represent the upper limit of normal concentrations, based on surveys across northwestern Ontario. Exceedance of a guideline may indicate a contamination problem. However, it is not a violation of Ministry regulations, nor does it necessarily imply health or environmental effects.

RESULTS

Results of snow chemistry analysis for the 1989 survey are shown in Table 1, along with data from the two preceding surveys in 1982 and 1985. As expected, highest parameter levels were found in samples from sites on CPFP property, where contaminant guidelines were often exceeded. Guidelines were usually met at sampling sites off company property. Where occasional guideline exceedances occurred off property (sites 14, 15, 20 and 22), black particulate matter was noted on and below the snow surface. Levels of all parameters declined as distance from CPFP property increased. Because this decline was statistically significant, it indicated that emissions from CPFP operations were the main influence on snow chemistry in the surrounding area.

The average levels of all parameters were usually much lower than those in 1985 and either lower or unchanged from 1982. This improvement was particularly evident for calcium, chloride and suspended solids. Above-freezing temperatures occurred on several occasions before the survey. Therefore, some of the apparent improvement in 1989 may reflect loss of some chemical elements in the snow under thaw conditions, rather than reduced emissions from CPFP. The distribution pattern for suspended solids is shown in Figure 2. There were similar patterns for other parameters.

Table 2 summarizes deposition rates at the 1989 sampling points. The rates are based on concentrations of total solids converted to deposition in grams per square metre for 30 days ($g/m^2/30d$). This calculation yields data that can be compared to the Ministry's dustfall objective of 7 $g/m^2/30d$. As Table 2 shows, this objective was met at all sites off CPFP property.

SUMMARY AND DISCUSSION

The snow sampling survey conducted in 1989 near Canadian Pacific Forest Products, Thunder Bay, showed a decline in average fallout levels from similar surveys in 1982 and 1985. This decline probably reflected, at least in part, the closure of the waferboard plant. Off company property, snow contaminant guidelines were either met, or only slightly to moderately exceeded.

Total solids in snow were found to be a reasonable surrogate for direct dustfall measurement. At site 7, average dustfall for the period December, 1988 to February, 1989 was 1.6 $g/m^2/30d$. The estimate from snow sampling was 2.7 $g/m^2/30d$. At site 20, dustfall was 2.8, while total solids in snow was 3.6. Given the crudeness of the measurement methods and the difference in sampling periods, these estimates compare well.

Based on the results of the 1989 snow sampling survey and comparable dustfall data, there does not appear to be a significant particulate fallout problem around Canadian Pacific Forest Products at present. Further snow sampling is not recommended, unless evidence of increased fallout levels is obtained. Dustfall measurements will continue at sites 7 and 20 to monitor the situation.

REFERENCES

1. Griffin, H. D. 1974. Snow sampling study, Great Lakes Paper, 1974. Ontario Ministry of the Environment.

2. Griffin, H. D. and D. J. Racette. 1975. Snow sampling study, Great Lakes Paper, 1975. Ontario Ministry of the Environment.

3. Griffin, H. D. and D. J. Racette. 1976. Snow sampling, Great Lakes Paper Limited, Thunder Bay, January, 1976. Ontario Ministry of the Environment.

4. Griffin, H. D. and D. J. Racette. 1978. Snow sampling survey, Great Lakes Paper Limited, Thunder Bay, February, 1978. Ontario Ministry of the Environment.

5. Racette, D. J. and H. D. Griffin. 1983. Snow sampling survey in the vicinity of Great Lakes Forest Products Limited, Thunder Bay, February, 1982. Ontario Ministry of the Environment.

6. Racette, D. J. and H. D. Griffin. 1987. Snow sampling survey in the vicinity of Great Lakes Forest Products Limited, Thunder Bay, February, 1985. Ontario Ministry of the Environment.

7. Ontario Ministry of the Environment. 1982. Field investigation procedures manual. Phytotoxicology Section, Air Resources Branch.

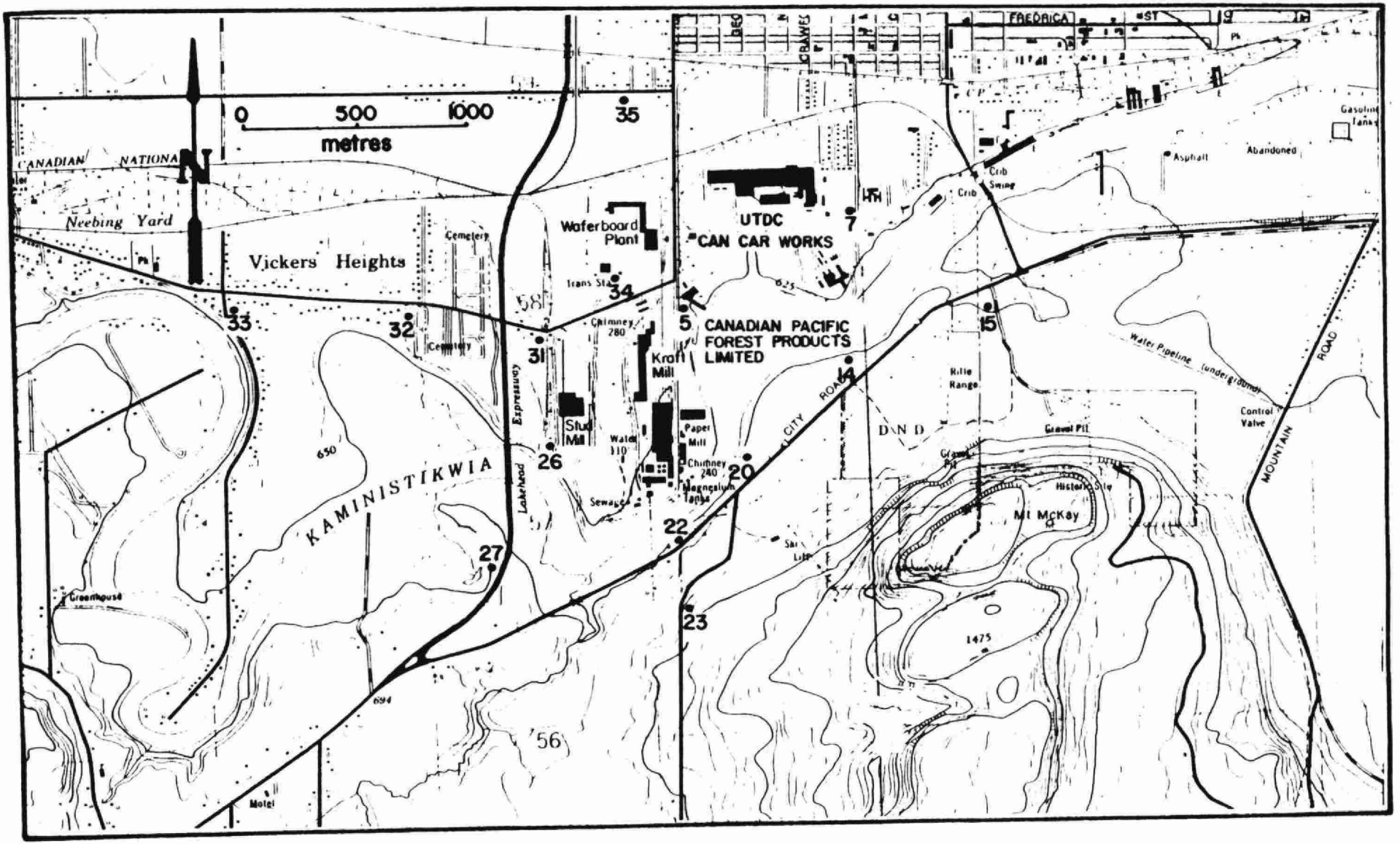

Figure 1. Snow sampling sites, Canadian Pacific Forest Products Ltd., Thunder Bay, February 14, 1989.

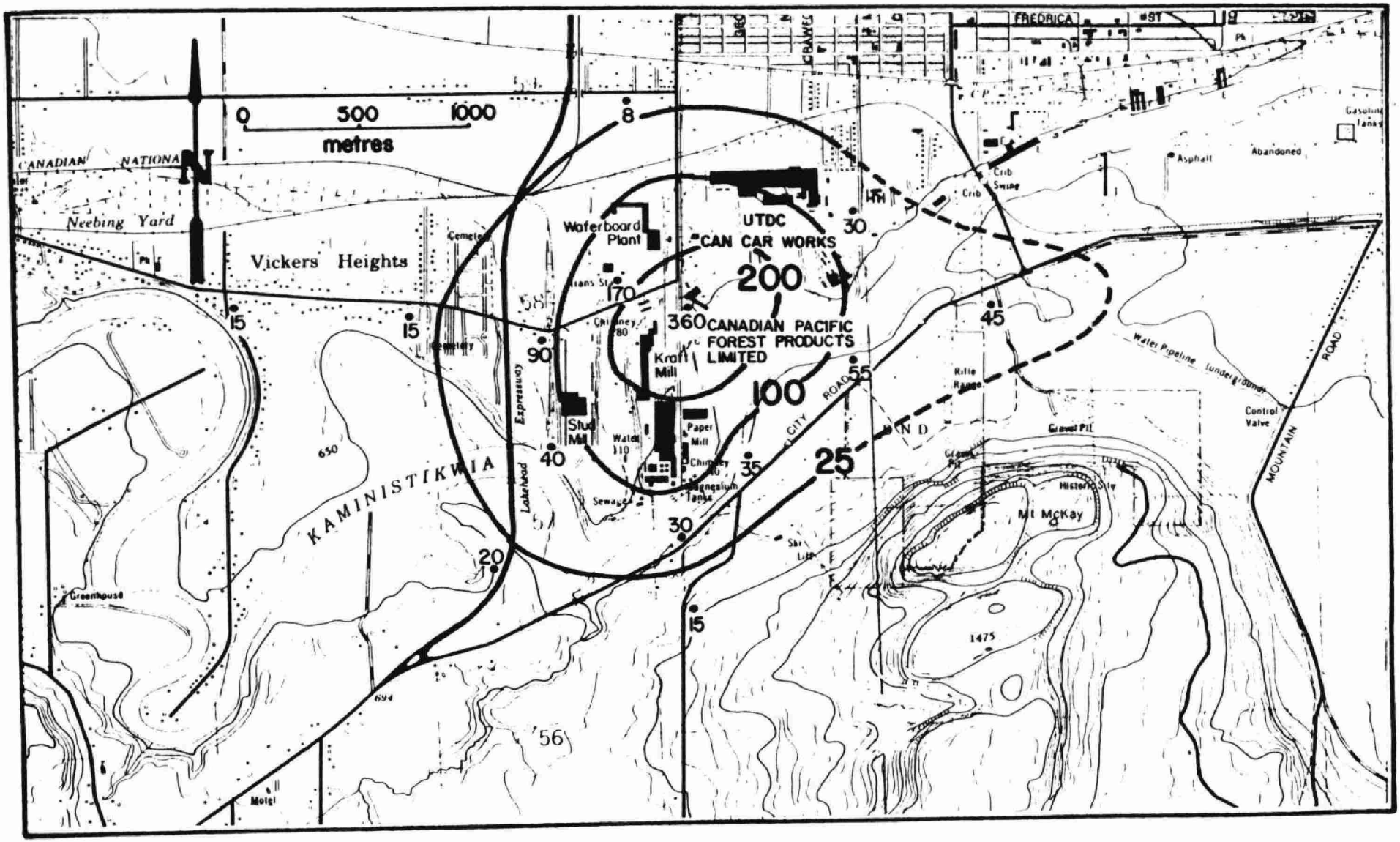

Figure 2.Suspended solids (mg/l) in meltwater from snow sampled February 14, 1989.

TABLE 1. Levels of selected parameters in meltwater from snow sampled near Canadian Pacific Forest Products, Thunder Bay, in 1982, 1985 and 1989. All values are in mg/l, except conductivity (μmhos/cm) and pH.

Sampling site[a]	Calcium			Chloride			Sodium			Sulphate			Conductivity			Suspended solids			pH		
	82	85	89	82	85	89	82	85	89	82	85	89	82	85	89	82	85	89	82	85	89
5[b]	48[c]	35	12	7	13	5	24	45	22	22	79	44	330	400	195	420	510	360	10.7	10.0	8.5
7	9	13	2	4	6	1	3	9	4	5	17	9	88	110	43	100	93	30	10.0	9.2	6.8
14	7	12	4	2	4	1	2	12	4	7	24	11	62	120	59	290	140	55	9.5	9.3	8.6
15	6	9	4	2	4	1	3	12	4	7	24	12	50	110	56	180	100	45	9.1	8.9	8.6
20	4	9	2	2	4	1	2	6	2	7	15	4	36	84	27	150	110	35	7.3	8.4	6.7
22	1	5	2	3	6	2	2	6	2	4	9	3	26	64	29	50	69	30	6.2	7.1	7.0
23	<1	1	1	1	1	1	<1	2	1	2	5	2	16	25	17	35	15	15	5.4	6.0	6.1
26[b]	2	12	4	3	6	2	3	9	2	5	19	4	34	100	41	110	160	40	7.0	8.9	7.7
27	2	9	3	4	9	4	3	10	4	5	16	2	34	100	43	150	80	20	6.5	8.8	7.4
31[b]	5	10	4	26	12	6	22	17	7	8	22	10	140	140	71	160	500	90	8.2	7.5	7.5
32	1	2	2	2	3	<1	2	6	1	5	13	3	24	61	21	50	27	15	5.9	6.9	6.7
33	<1	2	1	1	2	1	2	7	2	4	14	3	20	59	19	30	22	15	5.9	6.6	6.1
34[b]	4	7	3	4	7	3	4	13	5	6	22	8	52	110	53	140	190	170	8.8	7.1	6.6
35	1	2	1	6	10	2	4	12	3	3	15	6	34	89	30	45	46	8	6.1	6.7	5.5
Controls	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	11	12	15	10	4	4	4.4	4.6	4.6
Guidelines		2			4			2			3			45			25				

[a] See Figure 1 for site locations.
[b] Sites on Canadian Pacific Forest Products property.
[c] Underlined values exceed contaminant guidelines.

TABLE 2. Deposition rates ($g/m^2/30d$) of total solids near Canadian Pacific Forest Products Limited, Thunder Bay, 1989.

Sampling site[a]	Deposition rate
5[b]	<u>28.2</u>[c]
7	2.7
14	5.8
15	4.4
20	3.6
22	2.5
23	1.2
26[b]	3.8
27	1.6
31[b]	4.9
32	1.7
33	1.7
34[b]	<u>9.2</u>
35	1.3
Controls	0.5

[a] See Figure 1 for site locations.
[b] Sites on Canadian Pacific Forest Products property.
[c] Underlined values exceed air quality objective of 7 $g/m^2/30d$.

DISTRIBUTION LIST

Technical Memorandum: "Snow sampling survey near Canadian Pacific Forest Products Limited, Thunder Bay, 1989".

City of Thunder Bay: Clerk (Mr. H. T. Kirk)

Thunder Bay District Health Unit: Medical Officer of Health

CKPR/CHFD TV: Thunder Bay Television News

CBQ Radio: News Department

CKPR 580 Radio: News Department

CJLB Radio: News Department

Chronicle Journal/Times News: Editor

Lakehead Living: Editor

Finnews Limited (Canadian Uutiset): Editor

Canadian Pacific Forest Products Limited: Manager, Environmental Affairs (Mr. W. Vrooman)

Ministry of Labour: Regional Manager, Occupational Health and Safety Branch

Ministry of the Environment:

Northwestern Region: Director
Manager, Technical Support
Manager, Industrial Abatement; District Officer

Regional Laboratory: Water Quality Supervisor; Trace Contaminants Supervisor

Northeastern Region: Chief, Air Quality Assessment

Air Resources Branch: Manager, Phytotoxicology Section

Approvals Branch: Supervisor, Industrial Approvals - Air

Communications Branch: Project Coordinator, Client Services (J. Steele)

Laboratory Services Branch: Supervisor, Water Quality Section